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THE IMPACT OF EVENTS UPON MASS POLITICAL ATTITUDES  
IN BERLIN, 1963/64  
AN APPLICATION OF POLYNOMINAL DISTRIBUTED LAG REGRESSION  
Helmut Thome

The article describes a project which sought to develop and apply a novel approach to studying the impact of events upon mass political attitudes by using time series data and the statistical technique of polynomial distributed lag regression. This approach offers a fruitful analytical perspective for historians, for policy science, for research on the dynamics of public opinion and, beyond that, of social and cultural change.

The research reported here was undertaken as part of a larger and still ongoing project(1) pertaining to the development of collective attitudes and behaviour in Berlin from 1945 to 1972. By working through a vast collection of documentary evidence, historical monographs, eye-witness and newspaper reports, and public opinion poll material the project has sought to reconstruct the process in which an anti-communist "consensus of resistance" emerged, was traditionalized and has changed. To do so project researchers have utilized theoretical approaches of a social psychological and sociological nature and applied various "quantitative" data-analytical techniques in addition to those "qualitative" methods that are more familiar to historical scientists.(2)

The present paper intends to introduce a few ideas about how studies concerning the impact of events upon collective attitudes might be conducted, with what theoretical concepts and data-analytical techniques. Although the approach described here was designed to deal with specific questions of our project and certainly needs to be modified and extended for further use, especially in other contexts, its general principles are broadly applicable to other historical periods and to a much wider range of problems studied in the social sciences. This would especially seem to be the case where demoscopic research is designed to appraise the effectiveness of policies and programs in retrospect.(3)

The first section of this paper presents the theoretical perspective and the objectives of our study; the second sketches the political situation in Berlin during the 1963/64 period under consideration; the third describes the data; the fourth outlines the statistical method; the fifth presents a few results as illustrations, and a final section points out some of the limitations of our approach as well as possible modifications and extensions.

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# 1. RATIONALE AND RESEARCH OBJECTIVES

Mass political attitudes as well as other attitudes are embedded in a wider system of culture. In a society, this provides people with general principles for cognitive orientation, rules of conduct and legitimation, and sets the forms of expressive symbolism. Our attitudes and behavioral orientations toward specific objects and situations emerge from processes of social interaction in which these (traditionalized) cultural patterns are invoked and also applied and modified. Apart from their cultural context we can understand neither the way attitudes are formed nor the way they "function" to guide actions and also to express identities. This is important not only on the level of conceptualization in the social sciences but also in the practical way empirical research is designed and carried out. The meaning of indicators for attitudes and events cannot be defined without prior reconstruction, however tentatively, of traditionalized cultures and subcultures.

The term "collective attitudes" may be used to refer to the whole configuration of "orientations" which are more or less commonly shared; and these extend from the most general and abstract principles "down" to specific evaluations of concrete objects and to behavioral intentions for certain types of situations.(4) In empirical studies, however, certain segments must be isolated for investigation for pragmatic reasons, because empirical research is inevitably more limited than theoretically called for. But even small pieces may be used "critically" to review the validity of theories, or they may be used "constructively" in order to build up more comprehensive theoretical accounts, and to improve methodological tools.

Collective attitudes are organized into structures which can be characterized by a great number of dimensions and "variables". When defining indicators as variables one must bear in mind that the items in question vary socially and in time. Thus, in a mass-attitude system there is variance not only in attitude-content but also in such structural dimensions as:

- the degree of internal coherence or segmentation (extent to which elements are truly related or not - see Heider's "unit relationship");
- the degree of internal consistency and cognitive complexity (compatibility and completeness of evaluative criteria and cognitions);
- the degree of external validity (their "appropriateness" in face of reality);
- the degree of social generalisation (consensus), of normativity and abstractness of evaluative criteria and cognitive standards,
- and in such terms the fashion in which collective attitudes receive motivational underpinning in personality structures (including the capacity of people to maintain a sensitive balance between commitment and distance vis a vis institutionalized normative systems).(5)

From the fact that collective attitudes function as interpretive structures and are rooted in interests and motivations, it follows that collective attitudes do not respond "mechanically" to outside stimuli. Rather, when events and objects are encountered they are, in Piaget's terminology, being "assimilated" to the interpretive structure, and, at the same time, this structure must "accommodate" itself to new or newly perceived objects or events. Cultural innovation requires traditionalized dispositions as resources and can in turn become part of a tradition - even after radical changes in it. Historical discontinuities, which may be experienced as identity crises, suggest that the complementary processes of assimilation and accommodation have been thrown off balance, which means that new events and experiences could not be assimilated to what was hitherto "known" and that traditional patterns were not sufficiently differentiated or had become too rigid to allow for adjustment.

We have very little empirical knowledge of how a larger community or population responds to perceptible events, and in responding how they thereby maintain and modify specific attitudes and comprehensive interpretive patterns. In sociology and political science attitude research has usually confined itself to cross-sectional studies in which attitudes are related to variables that are thought to reflect a subject's location in a given social structure and communicative network, past or present, for example: socio-economic status, age cohort, sex, affiliation with and position in various social organizations, and exposure to the mass media. Only rarely have social researchers ever related attitudes to changes in objective conditions and to perceptible events in more than an impressionistic manner. Thus, Nie and Andersen have observed:

"The problem with the classical theory of mass beliefs is that it is built around notions of enduring characteristics of the mass public, of the sort which are relatively impervious to changes in the nature of the political world. Linking changes in attitude structure instead to events in the real world, which are not measureable characteristics of individuals, is a much more difficult task." (1974, p. 579)

There have been a number of studies about the impact of single spectacular events such as the assassination of president Kennedy (Greenberg & Parker, 1965), abductions (Sorrentino & Vidmar, 1974) or world political crises (Deutsch & Merritt, 1965). However, even when cross-sectional measurements are repeated several times, they are not suitable to deal adequately with problems we face: the problem of statistically controlling for concurring events and our interest in tracing the time path of the impact. We not only need to construct attitudes as measurable variables but also events (and ultimately events-in-situations) as such. Also we have to develop (or rather adapt) data-analytical techniques which enable us to advance toward finding answers to the following kind of questions:

- a) What category of events (situations) do or do not have a noticeable impact on the "magnitude" of specific attitudes and/or upon structural aspects of the interpretive scheme that culture provides?
- b) Does impact differ with different populations (cross-culturally)

with sub-populations (sub-culturally), and in different periods of time (historically)?

- c) What is the intensity of the impact? What is its temporal pattern: i.e., how much delay is there, when is maximum impact (and possibly a new equilibrium) reached, how long does it last?
- d) Having constructed indicators which are located at different "positions" in the overall structure of the collective attitudes under study - a structure tentatively and preliminarily reconstructed beforehand - we may want to ask: Where (in which positions) does the impact show up? Tracing the time path of event impact for different positions in the attitude syndrom may offer clues about the linkage structure connecting the various elements of collective attitudes.

Other questions could be added to this list. For example, how do changes in attitudes reflect "back" and influence the likelihood that certain events be initiated by political and social elites who observe a public's reaction? However, at this point there is little value in elaborating further a research program which even as described in the preceding paragraphs goes far beyond the capacity of the data at our disposal and the statistical model we have used thus far to begin tackling such questions. Yet, it is worth noting that applying this methodology and reflecting about the findings reached in doing so has in turn stimulated our theoretical thinking by helping us to differentiate and extend the questions we initially asked and to clarify some of our initial concepts.

The questions which set this particular study in motion were essentially "historical", but close enough to us in time to have contemporary relevance. How did West-Berliners respond to the daily stream of events that were reported in the media from August 1963 to June 1964? Which events strengthened or weakened support for various political actors - and when doing so, to which extent and for how long? What strengthened or weakened the "morale" of the population, its desire to resist perceived communist threat? What tended to increase fears and hopes?

To our knowledge, the mathematically most advanced method for studying the impact of events on attitudes has been developed by Lutz Erbring (1975) who also applied his model to Berlin data. Apart from differences in our approaches with regard to theoretical perspectives and historical interpretations, Erbring has examined the long-term impact of a few outstanding events, whereas we thought it worthwhile to concentrate at first on the immediate effects and short-term impact of a wide range of event stimuli as reported in daily newspapers. Thus, we hoped to gain some insight into the cumulative impact that repeatedly occurring events might have, even though they appear to be of minor importance when looked at singly. We have not been very successful on this specific point, but the effort has helped clarify some of the conceptual and methodological problems posed by processes of traditionalization, cumulative cognition and learning that occur in mass-attitude systems.

## 2. THE POLITICAL SITUATION AUGUST 1963 - JUNE 1964

The brief period dealt with here was not marked by major crisis events like the blockade of 1948/49, the Krushchev-Ultimatum of October/November 1958 or the erection of the Wall on August 13, 1961. Hence, statistically and comparatively, we are dealing with reduced variance in our independent variables. The political events reported by newspapers were mainly ordinary occurrences in the daily lives of Berliners. However, there was one complex that did bear the sign of novelty: "talks" leading to the first pass-permit agreement between the Senate of West-Berlin and the GDR, which permitted West-Berliners to pass the Wall and visit East-Berlin during the Christmas and New Year holiday period of 1963/64. The question of "pass-permits" had long ceased to be a significant theme of public discussion when, quite unexpectedly on December 7, 1963, "Der Tagesspiegel" reported that negotiations were going on. How would Berliners respond to what appeared to be a significant change in policy, a change that could be expected to pose some interpretive problems for a population whose political role and sense of identity was anchored in a consensus and tradition of having resisted communism. In retrospect, these were indeed early steps in the transition from cold war politics to the politics of detente. However, at the time detente was far from being apparent to or anticipated as a convincingly evident possibility by people in Berlin. Cognitively and emotionally they were still under the spell of an extended crisis period, which had begun with the Krushchev-Ultimatum of 1958 and had reached a visible peak in August 1961; but following the violent aftereffects of erecting the Berlin Wall and the more recent Cuban missile crisis of October 1962 the long crisis period did not yet seem to be over and done with. The Wall remained. The separation of East- and West-Berlin was still felt acutely. Yet, when on February 17, 1963 an election was held shortly after Berlin's traditional "coalition of anti-communist resistance" between CDU and SPD broke up because the CDU refused to go along with Governing Mayor Willy Brandt's plan to meet Krushchev in East-Berlin, the Christian Democrats lost heavily. The Social Democrats and Liberal Democrats (FDP) formed a new coalition government.

There followed president Kennedy's visit to Berlin in June 1963 as the highly visible symbolic peak of verbal and material assurances of the Western Allies' determination to remain in Berlin. Since Kennedy also pointed the way to detente, this demonstration also provided the West-Berlin city government (The "Senate") with a measure of legitimation to undertake cautious steps of its own to transcend the conceptual and political immobility of cold war positions. In this context the most controversial problems that arose were in connection with two principles: the absolute necessity to avoid any moves that would (1) call into question the supreme responsibility of the Western Allies for West-Berlin and/or could (2) upgrade the status of the regime in East-Berlin (and hence weaken the four-power status of Berlin as a whole). It thus became a matter of interpretation and debate on what level and with whose authority the negotiations that paved the way for wall pass-permits were to be negotiated and how an agreement could be concluded. Newspapers repeatedly reported disagreements between the Bonn government and the Senate of West-Berlin on such matters.

This was particularly true when, after the first pass-permit "action", from 12th of December 1963 to January 5, 1964, "talks" were renewed. On February 28, 1964, it was announced that there would be no new permits during the Easter holidays, and later on that there would be none for Whitsuntide either. Nevertheless the "talks" between the Senate and the GDR did continue and were intermittently reported in the news.

### 3. DATA

Over the period from August 23, 1963 thru June 28, 1964, 16 public-opinion-polls were available to us. All of them had been conducted by the same institute (Berlin-Test Dr. Klaus Schreiber) using carefully controlled quota-sampling. The sample size was customarily about 300 cases; each polling period had lasted about 2 weeks. Since the date of each interview had been recorded and coded we were able to pool the data from all 16 studies and resample them into weekly groupings. By this procedure 31 sub-samples of size  $N \geq 30$  could be assigned to their respective weekly intervals, which, with one major exception, spread fairly regularly over the total period of 44 weeks. Gaps were filled by linear interpolation. The exception was a period from mid-December to the end of January, which confronted us with a gap of 6 weeks. However, from another poll conducted in early January, we were able to retrieve three of our attitude indicators, and it turned out that their values departed from our interpolation figures only to a very slight degree. (6)

Five attitude trend questions had been employed in all of the 16 Berlin-Test surveys: (1) worry or optimism with respect to Berlin's future political development, (2) trust in the Western Allies' promise to protect the freedom of West-Berlin under any circumstances, (3) evaluation of the Soviet-Union's chances of ultimately having her way in Berlin by realizing her plan to transform West-Berlin into a "Free City", (4) party preferences, (5) agreement with the policies of Berlin's Governing Mayor.

For each of these 5 indicators time series were constructed in the following way: The answers were coded into two (1/0) or three (1/.5/0) categories, e.g.: 1 = worried; 0.5 = undecided or don't know; 0 = not worried. The individual values were aggregated to arithmetic means representing the "collective" attitude values. (7) (Multiplying by 100 would lead to a percentage interpretation.)

Apart from interpolation a few additional technical manipulations were necessary, which need not be mentioned here. We are more concerned here in demonstrating the principal analytical fruitfulness of a particular methodical approach than with the validity problems of particular results that arose from working with an imperfect set of polling data.

Our attitude variables were to be related to events. What about our event-data? As mentioned before "events" were operationalized from news presentation in daily newspapers. For this first experimental study we used "Der Tagesspiegel", a newspaper of liberal

conservative reputé. Compared to other major dailies in the city reporting in this paper seemed fairly "objective". Generally all major political events were reported on the front page. A problem of "representativity" did, of course, arise, since only 12 % of the West-Berliners interviewed said they were regular readers of "Der Tagesspiegel". However, we found this justifiable because a) during the period under study differences of opinion in commentary and news selection were generally not as evident or as significant as would later be the case in comparison with other West-Berlin newspapers; and, more important, b) the standards governing news reporting by radio were far more similar to "Der Tagesspiegel's" journalistic standards than those applied in the mass circulation press.

From day to day all the front-page headlines and all portions of the text that were emphasized in heavy print on the frontpage were coded (8) according to various criteria:

- by content (whether threat or support was implied, negotiations referred to, etc.);
- according to who the actors were (Western Allies, UdSSR, the Bonn or the Berlin government) and whether they acted singly or jointly or interacted as opponents;
- according to the level on which action occurred (by heads of government or subordinates);
- the implications of acts for traditionalized policy patterns, (was the traditional "image" or "role" of an actor confirmed or contradicted?);
- what broad areas of politics were concerned (the economy, domestic policies, the legal and political status of Berlin, external security);
- what political-geographical areas were directly effected (e.g., Berlin, Germany as a whole, Eastern Germany, Eastern or Western Europe);
- and finally the intensity with which the news was presented visually (visibility ranging from heavy print to unusually large headlines: scores from 1 to 4).

Each of these criteria was constituted either as a single variable or as a set of variables which could easily be combined and rearranged to suit analytical purposes by using computerized recoding routines. The data collected for each day ("Der Tagesspiegel" was published from Tuesday thru Sunday) had to be aggregated into weekly intervals that would match our time-series of attitude-indicators.

In addition to studying the impact of events upon attitudes it proved interesting to examine the interrelationships between various event-series, using, for example, cross-correlation functions (9) as instruments.(10)

We have done some of this kind of analysis, for example, by relating the occurrence of measures taken by the "West" to support Berlin with actions of the "East" threatening Berlin. However, since we want to concentrate on the impact of events upon attitudes, in



this paper we will deal with two groups of variables: the series of events, which in this first step of analysis, are treated as independent variables and the attitude-indicators as dependent variables. (11)

#### 4. THE DATA-ANALYTICAL TECHNIQUE OF POLYNOMIAL DISTRIBUTED LAG REGRESSION

As stated above, we want to know what categories of events (compared to others) do shape specific mass political attitudes: what is the magnitude and temporal pattern of impact? We expect an event impulse  $X$  at time  $t$  ( $x_t$ ) to produce an attitude component  $\beta_0 x_t$  in  $y_t$ , another component  $\beta_1 x_t$  in  $y_{t+1}$  and so forth until we find a last significant component of  $\beta_t x_t$  in  $y_{t+k}$ . If this reaction pattern is fairly constant over time, then the value of  $Y$  at any point in time may be expressed as a linear function of the current and the  $k$  previous values of  $X$  plus a "starting" value  $C$  and an error term  $u_t$  (representing measurement error and the contributions of left-out variables):

$$(1) \quad Y_t = C + \beta_0 X_t + \beta_1 X_{t-1} + \dots + \beta_k X_{t-k} + U_t$$

Estimates of the regression weights  $\beta_0 \dots \beta_k$  would provide us with the information about how, in what pattern, the impact of event  $X$  (unit impulse) unfolds itself - on the average - during a period of  $k$  intervals. As the equation now stands estimation of the Beta parameters poses a number of problems:

- a) We do not know the lag factor  $k$ ; in other words, we do not know in advance how long the impact lasts. Theory and/or estimated cross-correlation functions may call for a rather large lag factor which not only eliminates the first  $k$   $Y$ -values and the last  $k$   $X$ -values from our analysis but, if the length of the time series does not include enough intervals, might also leave very few degrees of freedom for estimating regression coefficients.
- b) The  $X$ -variable is likely to be serially correlated, i.e., the various lagged values of  $X$  might be intercorrelated. This confronts us with the problem of "multicollinearity" and the danger of producing unreliable estimates of the regression weights.

We can at least partly cope with these problems if we are ready to accept certain a-priori assumptions regarding the form of the  $\beta$ -coefficients, which describe the temporal pattern of impact the event variable has. Statisticians have developed several models for our consideration. In the "Koyck"-model, for instance, the regression weights decline geometrically from the beginning. This pattern is exemplified by the so called "forgetting curve" familiar to us from learning experiments. The short-term impact of events upon collective attitudes can hardly be expected to follow that pattern. Instead we chose to assume the following: there will be a certain period in which an event (or rather, the news of an event) will be socially diffused and interpreted in the community. Generally this means that some time will lapse before that discrete event reaches maximum impact. There may even be a "dead time"

during which individual reactions will be delayed or can cancel each other out showing no impact on the aggregate level at all until a certain version of interpretation becomes dominant in the community. Thus, we generally assume that in our sample the (estimated) regression weights that trace the impact of events over time (to describe summarily what was their characteristic impact pattern for a certain period) will roughly follow a pattern shown in figure 1.

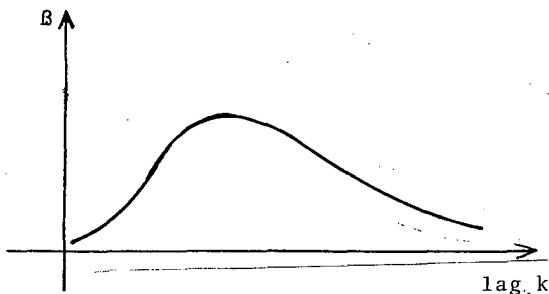


Figure 1

This pattern can be statistically accommodated by the "Almon"-model, which is based on a mathematical theorem according to which we can approximate any curve continuous in a closed period by a polynomial of suitable degree "r". A function like the one graphed in figure 1 can be approximated by a polynomial of order  $r = 3$ , the general form of which is:

$$(2) \quad f(z) = a_0 + a_1 z + a_2 z^2 + a_3 z^3$$

Consequently the  $\beta$ -weights can be expressed in the following way where the "z" represents the indexed time lag:

$$(3) \quad \begin{aligned} \beta_0 &= f(0) = a_0 + a_1 \cdot 0 + a_2 \cdot 0^2 + a_3 \cdot 0^3 \\ \beta_1 &= f(1) = a_0 + a_1 \cdot 1 + a_2 \cdot 1^2 + a_3 \cdot 1^3 \\ \beta_k &= f(k) = a_0 + a_1 k + a_2 k^2 + a_3 k^3 \end{aligned}$$

Substituting equations (3) into equation (1) we obtain

$$(4) \quad Y_t = c + a_0 x_t + \underbrace{(a_0 + a_1 + a_2 + a_3)}_{\beta_1} x_{t-1} + \dots + \underbrace{(a_0 + k a_1 + k^2 a_2 + k^3 a_3)}_{\beta_k} x_{t-k} + U_t$$

We know  $Y_t$  and all the  $x$ -values from observation, and the order of the polynomial ( $r = 3$ ) from theoretical considerations, whereas the choice of the lagging factor  $k = 11$  in our case was determined arbitrarily taking into account the limited number of

time points available to us. (12) Choosing an impact period and thus a lagging period of 11 weeks implies the elimination of the first 11 y-values and the last eleven x-values in our series. Writing the  $\beta$ 's as function of Z ( $Z = 0, \dots, k$ ) at least reduces the number of previously 12 unknown weights to  $r+1=4$ .

The Almon algorithm enables us to estimate the unknown  $\alpha$ -parameters by rearranging equation (4). (13) From the  $\alpha$ 's one can subsequently calculate the  $\beta$ 's applying equation (3).

The actual computations were performed by the TSP ("Time Series Processor") program implemented at the Technical University Berlin. (14) The program prints out, among other things, the Coefficient of Determination ( $R^2$ ), the numerical values and a graphical representation of all the regression coefficients and various test-statistics.

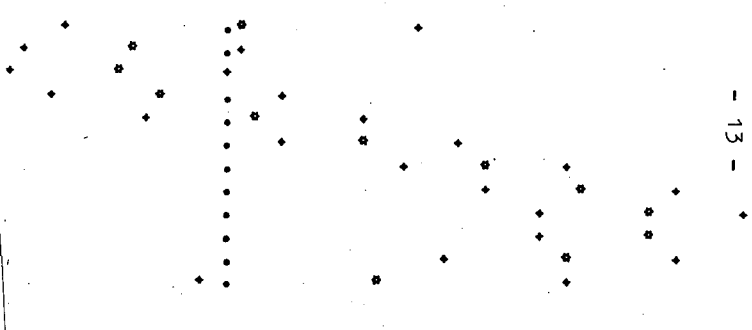
Figure 2 copies the results of the regression of approval for the Governing Mayor on the visibility of news about general East/West conflicts (V 7M). From the diagram and the listing of the regression coefficients we can readily see that the impact was delayed until after the third week and reached its maximum value in the eighth and ninth week. We must bear in mind that the coefficients are average values and describe how much change in the attitude indicator was brought about by a single unit of change in X (in this case a one-point increase in visibility, e.g., from 0 to 1 or from 2 to 3) as observed for the whole period, and not for a specific event stimulus. (15) Hence, in our example, we find that on the average a single headline about East/West conflicts - i.e., a headline with visibility of 3 points - reduces approval of the Governing Mayor's policies at the time when maximum impact is reached for  $3 \times 0.92 \% = 2.8 \%$ . (16) This being, of course, a tentative finding, as long as we do not control for confounding influences of other variables as well.

Application of the Almon-model is not limited to the case of a single X-variable. Overlooking for the moment the question of multicollinearity and problems that arise from further decrease in degrees of freedom, with this model we can introduce additional variables in order to calculate partial coefficients (resulting from statistical control of confounding influences), and we can also introduce multiplicative terms in order to represent interactions between two or more independent variables. For example, we might want to see, if the impact of negotiations on a "morale" indicator differs according to whether or not news about East/West conflict occurred at the same time (see more about this on page 15 f. below).

We face a number of statistical problems which cannot be discussed in a brief paper. For example, questions about the appropriateness of the OLS-regression which we have used. (17) Also, flawed as our data are, the patterns of regression weights we obtained often show a high degree of instability and often do not pass conventional statistical tests. We do not claim that our results are valid in this sense. Yet we find encouraging that, despite such shortcomings, the results we obtained have, in most cases, been interpretable in the light of our foregoing historical and theoretical

DISTRIBUTED LAG INTERPRETATION FOR VARIABLE : V7M

Degree of the polynominal = 3  
 Number of periods = 12  
 Zero restriction = 4

	Coefficient	STD. Error	T-Statistic	Plot of the Lag Distribution(•) and STD Error Band(+)
0	.2229E-03	.3849E-02	.5790E-01	
1	-.2062E-02	.2463E-02	-.8370	
2	-.2454E-02	.2484E-02	-.9881	
3	-.1413E-02	.2583E-02	-.5471	
4	.6019E-03	.2389E-02	.2519	
5	.3133E-02	.2064E-02	1.518	
6	.5721E-02	.1908E-02	2.998	
7	.7907E-02	.2043E-02	3.869	
8	.9232E-02	.2250E-02	4.103	
9	.9239E-02	.2333E-02	3.960	
10	.7467E-02	.2582E-02	2.892	
11	.3458E-02	.3970E-02	.8711	

Mean Lag = 8.92157

Standard Error of mean lag = 5.11289

Sum of lag coefficients = .410525E-01

Standard error of sum of lag Coefficients = .101017E-01

Figure 2

analysis; also the results of this experiment have added suggestively to our knowledge and concepts. It is for these reasons that we believe that the potential analytical fruitfulness of this kind of methodical approach can be demonstrated more firmly, if it is modified and extended in the fashion indicated in the last section of this paper.

## 5. ILLUSTRATIVE RESULTS (18)

Limited space does not allow for complete presentation of the findings derived from applying the regression technique described above. (19) To illustrate our analysis we will concentrate on attitudinal responses to East-West talks and negotiations.

In Berlin, popular determination to resist communist threat was not incompatible with a flexible and realistic stand on the question of East-West negotiation. An international Gallup poll conducted in many major cities throughout the world in the late fifties found that Berliners were second only to residents of New Delhi in their approval of a summit meeting taking place between the Western powers and the Soviet-Union. From other polling data we know that Berliners had often been more in favor of negotiations than West Germans in the past.

In the 1963-64 period under consideration here, our data indicate that when steps were taken toward easing tension in the global East-West relationship they were generally welcomed by Berliners; three weeks after "Der Tagesspiegel" brought news of this kind "fear" that the Russians would succeed in getting what they wanted in Berlin had decreased by 0.8 % (20) per visibility unit, before moving back to the initial level toward the end of our 11-week lagging period. (21) Even more pronounced was the drop in "worries" concerning future political developments in Berlin. In response to a single unit message they decreased 4.3 % (after 3 weeks), and again a return to the initial level after 11 weeks was registered - as long as additional news of the same kind had not occurred in the meantime.

A positive but not so significant effect was also indicated with regard to popular approval of the Governing Mayor and support for SPD and FDP, the parties forming Berlin's coalition government.

However, we have to differentiate between measures to relax tensions in the global East/West relationship and those specific negotiations or moves that concerned the status of Berlin more or less directly, and which were, in our period, mainly carried on by the West-Berlin Senate in order to obtain wall-pass permits. With regard to the latter type of negotiations Berliners apparently distinguished clearly (and, we think, in a rational fashion) between their principle political justification and the way they were carried out. From additional trend data (too widely and irregularly spaced to be included in our time series analysis) we know that the negotiations found a high level of approval from the beginning and that approval even increased during our period while criticism of the way the Senate handled them increased to an even more pronounced degree. By applying distributed lag regression we are able to obtain an improved picture of this response pattern:

Regressing "fear of the Russians" on the specific negotiation variable alone produces no clear cut result. A negative tendency (increase of fears within 9 weeks) is reduced or eliminated if we control the impact of simultaneously occurring "conflict"-news in an additive model. However, there seems to be a period effect (technically, an interaction between a period-dummy and the negotiation variable):

The negative impact is apparent only in the first subperiod, until early February; it gives way in the weeks thereafter to a slightly positive effect. (22)

Very similar is the pattern that emerges with respect to being "worried" about the city's future political development. A negative tendency (toward increased concern) disappears when the effects of concurring threat by Russian measures against the status of Berlin is taken into account statistically. However, the absence of threatening measures alone does not produce a positive impact from negotiations. If we control not for reports about conflict moves but for reports about action taken to relax tensions in general (doing so in an incomplete, "unsatiated" interactive model), the negative impact reappears as a tendency in the regression coefficients. Apparently, the city governments' novel and risk-ready policy to conduct negotiations with the GDR needed to be accompanied by reassuring signs of global "relaxation" in order to check an otherwise possible increase of insecurity with regard to Berlin's political future.

Once more a period effect is indicated here; a negative impact tendency is characteristic of the first subperiod, but this is followed by a positive tendency in the second period - perhaps after it had become apparent that the "West" would not be "taken in" by communist negotiation tactics. (23)

With respect to the coalition parties and the Governing Mayor we noted an almost reversed pattern. Although statistical significance is lacking, it seems that negotiations may have had a slightly positive effect during the first and a negative impact during the second subperiod.

Thus, if we do not let ourselves be deterred too much by being called upon to interpret these findings somewhat speculatively, the overall response-pattern does suggest some interesting characteristics. "Talks" with East-Berlin were not just single actions; they had become a principle emphasized by having been continually acted upon. Although this novel policy appeared to involve risk and, taken by itself, tended to increase feelings of fear and insecurity, in general it nevertheless received high and rising support in the population. The perception of risk was counteracted by trust in political actors (particularly in the Social Democrats and Willy Brandt) who had "proved themselves" to be worth trusting in a longterm struggle against the communist threat, which had included various crisis situations in the past. At the same time, basic trust did not preclude criticism of the actors. After a time negotiations no longer increased anxieties about the future of Berlin but tended to lower them. This did not, however, produce a pay off for those who initiated the negotiations: the decrease in anxiety seems to have allowed more room for criticism as well.

This interpretation is supported by two other findings of the regression analysis. We constructed two variables relating to the use of force by communists: (1) acts occurring along the Berlin "Wall" or on the routes of access to Berlin, (2) acts taking place in areas not directly related to Berlin. The second variable, communist use of force unrelated to Berlin tended to lower support for the Governing Mayor and the coalition parties. But when force was applied directly against Berlin, this negative effect disappeared and gave way to a slightly positive tendency to give Brandt approval.

Another indicator also suggests that there may be an internal compensatory mechanism which operates to keep the system of collective attitudes in balance around a nexus of consensus. As already noted, Berlin's security was perceived to depend mainly upon two sets of actors: the Soviet government and the Western Allies. A non-lagged cross-correlation of the two variables: fear of the Russian and trust in Western allies reveals that these two attitude indicators generally move in the same direction; but if we regress one variable on the other (either way) and extend the lagging period up to 19 weeks, we see that the coefficients turn negative for a number of intervals before approaching zero. Should this result be corroborated (24) it would indicate that an increase of fear (or distrust) centered on one actor triggers off internal compensatory reflections to lower distrust (or fear) in connection with the other actor. Or the other way round: a decrease of fear (or trust) may "allow for" an increase of circiticism (or fear). Specific coding procedures or the addition of specifying dummy variables would enable us to test which of the 4 combinations are more (or less) likely to occur - if we could extend our data base over a longer period of time.

## 6. DISCUSSION

Little space remains to discuss the merits, shortcomings and possibilities of extending the methodical approach presented here. Its general value to the social scientist, the historian and also to the politician, enabling them better to judge retrospectively and to anticipate the magnitude and temporal pattern of the impact of events (including policies) on mass attitudes and mass behavior, can be left to the readers imagination.

The kind of information that can be obtained from distributed lag regression obviously lies far beyond the insights one can draw from visual inspection alone and/or from the conventional methods employed to decompose time series data into trend, seasonal and random components - a conclusion which, as we have indicated, by no means makes visual inspection superfluous.

Attitudes respond to a multitude of stimuli, and it is important to isolate different types of influences (e.g., different categories of events) by techniques of statistical control - such as multiple regression analysis. With sufficient data and precise in-

formation about the temporal dimension of response-patterns it is also possible to infer causal chains within the attitude system (and this, of course, can also be done with dependent variables for other domains of social reality).

One capacity of this method which is specifically relevant to the historian is the detection of period effects. Attempts at "periodization" are often left to rather impressionistic constructions that focus on very few indicators. With this research instrument "periodization" may now be conceptualized operationally as an informed and systematic search for the breaking-points, where the structural parameters (regression coefficients) which link one set of variables to another set of variables or which indicate a "level" are altered significantly, due to a hitherto unspecified influence which thus far only could be summarized under the label of being a "period-influence".(25)

The greater the precision that can be exercised in identifying a "period" in terms of time intervals and the range of variables effected, the greater is the likelihood that we may be able to break down the summary concept of "period-influence" by discovering what are the component "forces" that actually did bring about changes in the parameters.

In our research example only single equations were estimated. At one point or another we have used cross-correlations and cross-regressions to identify reciprocal relationship between two variables. There are available fairly simple extensions of the regression approach based on the notion of auto- (or serial-) correlation, which have the statistical capacity to deal more soundly with bivariate reciprocal relationships.(26) A structural equations approach(27) would let us estimate reciprocal relationships in systems of more than two variables. Being able to identify reciprocal or "feed back" relationships would obviously have an important impact on the application and development of theory. It would help us to deal better with collective attitudes as a "system" and to answer more adequately the question: to what extent do collective attitudes, in turn, influence events and more specifically, the policy measures which various actors and institutions take.

At this point a brief remark is in order about the problem of working with aggregated data. Nowadays researchers are generally aware of the so-called "ecological fallacy", a notion which points to the difference between correlations between grouped (aggregated) and ungrouped data; they can only be equated under rather exceptional conditions. However, if the model expressed in the regression equation is correctly specified (which concedingly does not happen very often in sociology), then the regression coefficients we obtain with aggregated data are also valid for corresponding relationships on the individual level. (Some models, however, only lend themselves to specification on the level of individual data.) This means that one may construct a diagnostic tool: misspecification is indicated if regression coefficients apparently differ only because of the grouping procedure.(28)



The preference of many social science researchers to work solely with individual level data is challenged by still another, related observation. In sociology individual level data are usually collected cross-sectionally. And cross-sectional data can easily induce a specific type of model-misspecification. Attitudes, for example, are under the constant influence of various "stimuli" which continually impinge upon them. Hence, attitudes are rarely in a state of equilibrium at the time of single or repeated one-point measurements. And especially in a situation of high consensus, individual movements are unlikely to balance each other out in the aggregate. Thus, if the rate of change in the dependent variable (toward or away from equilibrium) correlates with the independent variable, we will obtain unreliable regression coefficients (unless the causal effect is instantaneous or infinitely slow). (29) This fact may explain quite a number of divergent results when survey analyses with the same population are repeated by using the same model at different points in time. Hence, even if our interest centers on individual level relationship we might have to resort to longitudinal studies (for which individual level data may not be available).

It is certainly true: that quite interesting developments on the level of individuals or sub-groups may cancel each other out (at least to some degree) on the aggregate level. Thus, the researcher should pay close attention to the degree of consensus and/or of structural homogeneity that is characteristic of the group under observation. Even in a high consensus situation, as did exist 1963/64 in Berlin with respect to most of the events we have studied, it would have been rewarding to disaggregate the population-data and construct time-series for different social groups. (Our Berlin samples were, of course, far too small to be disaggregated.) Even should they react similarly to events, the temporal dimension of their response patterns might differ considerably. Such differences might provide us with suggestive hints for researching what lies behind such differences in the way "influence" is diffused in society. For example, to mention a very simple case, it is possible that group A typically arrives at an interpretation earlier than group B, which then might pick up the response from A or, under improved statistical control, may prove not to have done so.

Apart from extensions like those mentioned in the preceding paragraphs, as improvements needed by our methodical approach, and apart from certain statistical problems that cannot be discussed here (for one, the need to use generalized instead of ordinary least squares regression) two major analytical shortcomings remain which will warrant our attention in future research.

The first relates to the coding procedure, but it also involves a more serious theoretical problem. Each of the news items, regardless if related to a "new" or an already ongoing situation, was dealt with as a single discrete stimulus, and its impact was mathematically modelled as a linear one. Theoretically it would be more desirable to construct event variables by grouping the stimuli (news items) which belong to the same "set" of events or actions (a situation, a campaign, a policy or a strategy etc.). This, of course, will always involve problems of delimitation; in certain

cases, it may be extremely difficult to mark the beginning and end of such an "event-set".

The second problem, whose solution may contribute to solving the first, concerns the phenomenon of cumulative impact. So far, our regression coefficients are average measures obtained from discrete stimuli. A trend development may then be expected to emerge if a new stimulus occurs before the impact of the preceding stimulus has petered out (before the response has returned to the initial level). But it is conceivable that these average measures are somewhat fictitious. We not only have to consider interaction effects between different event variables (which basically can be dealt with by the regression framework we have used and described here), we must also reckon with interactive effects between stimuli of the same event-category variable over time. Repeated stimuli of the same kind may sensitize or desensitize a population, accelerate reaction in one case or de-accelerate it in another. Both movements may be more or less gradual. Such information cannot be "read off" the regression coefficients that result from equations like those we have defined so far. One way to go about solving the problem might be to construct "design matrices" (30), a procedure employed to fit pre-conceived theoretical models which would explicate the assumptions about interactive effects by repetitive stimuli. In other words, the effects must be hypothesized beforehand (alternative models should be tried out, of course) and expressed as vectors in an impact matrix. One can then test by way of regression analysis which of the models best fits the time-series.

One other problem, closely related to those already mentioned, should be referred to. A distinction should be made between dramatic, outstanding events (like the Khrushchev-Ultimatum or the erection of the Berlin Wall) and more ordinary events. It seems advisable to conceive of certain dramatic events as "interventions" that warrant receiving specific treatment in statistical analysis. Box & Jenkins, (1976) and Box & Tiao (1975) have suggested so-called transfer functions which can simultaneously deal with interventions of this kind and other, stochastic variables (31) without necessitating our making restrictive assumptions with regard to the numerical and temporal dimensions of reaction patterns. The major difference between this model and distributed lag regression in the econometric tradition lies in the way the error term is dealt with. We are presently experimenting with the application of transfer functions to another set of time series data of the Berlin Projekt: monthly data with a reduced catalogue of attitude and event variables covering the period from 1950 thru 1963.

Historians and other social scientists - also when they are interested in basic theoretical questions of social and cultural change - will only be able to utilize the analytical and methodical approach indicated here to the extent that appropriate data is produced and made available for general research. Therefore, a last word is due regarding the practical value of this research instrument for applied social sciences, policy-science and policy-making. Only when the practical value of the instrument is recognized will the attitudinal and in many cases also the behavioral indicators appropriate for time-series analysis be produced

systematically and on a large scale in fields that engage the attention of sociologists, political scientists and historians. Taking our own interest in the dynamics of attitude change as an example, the consequence could be far reaching change in designing demoscopic survey research. It would call for a continuous program with very short term polling intervals that include a solid array of theoretically derived attitudinal trend questions and sample sizes adequate for disaggregation in analysis. Beyond that there would be the problem and challenge of having to record systematically the public output of policies, programs and campaigns as registered and documented in relevant media - and to place them alongside of the event-sequences and offerings of symbolic contexts that effect their meaning over time.

The value to policy-science research of being able to assess the effectiveness of programs and the impact of events retrospectively over time is self-evident. This value would increase as the data-base grows in volume and covers ever longer period of time. To test and improve the utility of our approach and to extend its reach for assessing long-term and especially cumulative impact obviously calls for a large-scale and long-term program of research, which it would seem, also calls for cooperation with policy-oriented research institutes.

Whether a social scientist is mainly interested in the development of basic theory, methods of analysis, or in improving his capacities as a policy-consulting practitioner, when it boils down to accounting for various phenomena of social and cultural change, they all share - at one point or another - a common need for the kind of data, the kind of dynamic analysis and the kind of application described here.

#### FOOTNOTES

1 The project is directed by Prof.Dr. Harold Hurwitz, Zentralinstitut für sozialwissenschaftliche Forschung der Freien Universität Berlin, and has been supported by research grants from the Berlin city government and the Deutsche Forschungsgemeinschaft. A first volume pertaining to the early post-war period will be published in 1981. The analysis presented here will be incorporated in a later project-publication. I am grateful to Prof.Hurwitz for his support and valuable suggestions that made possible the particular study reported here.

2 See for example a treatment of relative deprivation in forthcoming article by Michael Faisst, Harold Hurwitz and Klaus Süh1, Die Berliner Sozialdemokratie und die Personalpolitik der Besatzungsmächte 1945/46, in: Internationale wissenschaftliche Korrespondenz zur Geschichte der deutschen Arbeiterbewegung, IWK (Scheduled Fall 1980).

3 See concluding remarks, p. 19 f.

4 The reader is referred to Helmut Thome, 1980, for a fuller elaboration of the theoretical concepts mentioned here, and also for a more complete presentation and discussion of the empirical study described below.

- 5 This capacity of the Berlin population in the cold-war and detente constitutes a major concern of the Berlin-Project.
- 6 We had to interpolate to fill the remaining information gaps because we wanted to use distributed lag regression; since this method requires equally spaced intervals, we could not leave out several weeks.
- 7 See p. 17 f. below for a brief discussion of the aggregation issue.  
An alternative way of coding would have been to treat each category of the 5 variables or combinations of categories across indicators as binary variables, thereby differentiating and enhancing theoretical content of the indicators at the expense of statistical independence.
- 8 The coding was conducted by Monika Knoche-Lindgens.
- 9 As is generally the case in time-series analysis, with cross-correlation functions the "cases" are no longer substantive units (like various individuals or groups) but time points - i.e., the consecutive values of an identical unit. In the case of a cross-correlation between a variable X and a variable Y (each displaying values for intervals  $t = 1$  to  $t = n$ ) a Pearsonian correlation coefficient is calculated successively while technically "lagging" the X-variable behind the Y-variable: first with lag = 0, then lag = 1 etc. Complementarily, one also reverses the direction and lags Y behind X. Inspection of the pattern of correlation coefficients thus provides clues as to the direction of influence and how it evolves over time.
- 10 For a discussion of other methods applicable for this type of "internal" event-analysis see H. Schadee, 1976.
- 11 For a few remarks about reciprocal relationships see p. 17 f. below.
- 12 It will usually be determined empirically by way of cross-correlating "prewhitened" X- and Y-series.
- 13 See J. Johnston, 1972, pp. 296-298 for a brief discussion and further literature.
- 14 We are grateful to Prof. Dr. Hans Heike, Fachbereich 20 of the TU Berlin, who made this program available to us, and to Bernhard Lenz, Obi Nmamoko, and Harald Rossa for their assistance at various points of time.
- 15 For further remarks on the interpretation of the regression coefficients see p. 19 below.
- 16 Remember that the figures have to be multiplied by 100 to obtain percentage values.
- 17 Usually with time series regression the residuals are serially correlated, thus requiring GLS estimation or Pseudo-GLS transformations; see D. Hibbs, 1974.

- 18 The substantive interpretation and our planning for application of the statistical model largely took place in project seminars devoted to this problem over an extended period of time. Professor Hurwitz and I benefitted here especially from contributions by Andreas Büning, Michael Faisst, Marie-Luise Tuttas and Helmut Wilke.
- 19 The attention of the reader is once again called to H. Thome, 1980, chp. 3 for a more complete presentation.
- 20 These are, of course, point estimates which, given the rather low degrees of freedom, always have a considerable standard error attached to them.
- 21 The polynomial does not force the coefficients to return to the starting value by the end of the lagging period.
- 22 Unfortunately, there were not enough cases - and hence degrees of freedom - for us to add the conflict variable to the negotiation variable and the dummy variable for "subperiod" as well.
- 23 Once more, it would be desirable to relate negotiations with threat, global relaxation and the "period"-dummy variable simultaneously in a more complex model including additive and multiplicative terms - but our data base is too frail for this requirement.
- 24 Not only by better data but also by more adequate statistical methods taking into account the auto-correlation of the variables.
- 25 Computing routines are available as aids for this research procedure. In the same vein one may test a pre-conceived periodization by asking: what is the range of variables which have indeed changed their level or the parameters of their structural relationship?
- 26 See, for example, W. Birkenfeld, 1974
- 27 For applications see R.P.Y. Li, 1976, and D. Hibbs, 1977.
- 28 For a highly illuminating discussion of the issues involved here see Lutz Erbring, 1975, chp. 3.
- 29 See again Lutz Erbring, 1975, for a detailed discussion
- 30 The construction of design matrices is more familiar to psychologists than to sociologists; see, for example, Revenstorf/Keeser, 1979.
- 31 For an application see D. Hibbs, 1977.

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